

This Listing of Claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-5. (canceled)

6. (currently amended) ~~An integrated device for receiving millimeter waves, the device. An apparatus, comprising:~~

~~a laser circuit able configured to generate at an output optical signals having two different frequencies that interfere with each other to produce an optical beat;~~

~~antenna terminals;~~

~~a first photodiode circuit connected configured to receive the optical signals from said laser circuit by means of a waveguide, to generate a first millimeter wave signal based on the optical beat, and to receive a second millimeter wave signal from the antenna terminals; and~~

~~means for subjecting the optical signals to optical beat to generate first millimeter wave signals in the photodiode circuit;~~

~~antenna terminals able to receive second millimeter wave signals; a second photodiode configured to receive the optical signals from said laser, to generate a third millimeter wave signal based on the optical beat, and to forward the third millimeter wave signal to the antenna terminals; and~~

~~a substrate on which the laser circuit, the first photodiode circuit, and the waveguide second photodiode are integrated; and,~~

~~contact elements of wherein the first photodiode circuit connecting the antenna terminals to the photodiode circuit so that is further configured to the second millimeter wave signals are fed to the photodiode circuit via the contact elements and are mixed mix the second millimeter wave signal with the first millimeter wave signals signal so as to cause generate an electrical beat between the first and second millimeter wave signals in the photodiode circuit.~~

Claims 7-26. (canceled)

27. (currently amended) The ~~integrated device defined in apparatus of~~ claim 6 wherein the substrate is made of semiconductor material.

28. (currently amended) The ~~integrated device defined in apparatus of~~ claim 27 wherein the semiconductor material comprises gallium arsenide or indium phosphide.

29. (currently amended) The ~~integrated device defined in apparatus of~~ claim 6 wherein the laser circuit comprises a ring laser guide of the ring type.

30. (currently amended) The ~~integrated device defined in apparatus of~~ claim 29 wherein the laser circuit is adapted configured to operate in passive mode-locking.

Claims 31-32. (canceled)

33. (currently amended) The ~~integrated device defined in apparatus of~~ claim ~~32~~6, further comprising:

a first waveguide coupling the output of the laser with the first photodiode; and
another a second waveguide connecting the other the output of the laser with the second photodiode circuit to the laser circuit.

34. (currently amended) The ~~integrated device defined in apparatus of~~ claim 33 wherein the ~~other second~~ waveguide has a first amplifier circuit.

35. (currently amended) The ~~integrated device defined in apparatus of~~ claim 34 wherein the first waveguide has a second amplifier circuit.

36. (currently amended) The ~~integrated device defined in apparatus of~~ claim 34 wherein the laser circuit comprises a coupler able configured to couple the laser circuit to the first-mentioned waveguide and to the ~~other second~~ waveguide.

37. (currently amended) ~~A Module for receiving millimeter waves, the module comprising:~~
~~an integrated device as defined in~~The apparatus of claim 7-6, further comprising an electronic circuit ~~connected~~coupled to the contact elements~~first photodiode and able configured to detect the modulating component~~electrical beat.
38. (currently amended) ~~A module for transmitting and receiving millimeter waves, the module~~The apparatus of claim 34, further comprising:
~~an integrated device as defined in claim 34;~~
a first electronic circuit ~~connected~~coupled with the first amplifier circuit ~~and able configured to generate a modulating signal to be superposed on the millimeter waves~~optical signals to be transmitted through the second waveguide;
~~a second electronic circuit connected with the contact elements and able to detect the modulating component superposed on the received millimeter waves.~~
39. (currently amended) ~~The module defined in~~apparatus of claim 37, further comprising
a bias element ~~connected with the contact elements and adapted~~configured to apply a bias voltage to the first photodiode circuit.
40. (currently amended) ~~The module defined in~~apparatus of claim 38, further comprising
a bias element ~~connected with the contact elements and adapted~~configured to apply a bias voltage to the first photodiode circuit.
41. (currently amended) ~~The module defined in~~apparatus of claim 38 wherein the modulating signal ~~to be superposed on the millimeter waves to be transmitted~~ is an analog signal.
42. (currently amended) ~~The module defined in~~apparatus of claim 38 wherein the modulating signal ~~to be superposed on the millimeter waves to be transmitted~~ is a digital signal.

43. (new) The apparatus of claim 6, further comprising:
a first resistor coupled between a first terminal of the first photodiode and a first terminal of the second photodiode;
a second resistor coupled between the first terminal of the first photodiode and a second terminal of the second photodiode; and
a third resistor coupled between a second terminal of the first photodiode and the second terminal of the second photodiode.
44. (new) The apparatus of claim 43, wherein the first terminal of the first photodiode is an anode, the first terminal of the second photodiode is an anode, the second terminal of the first photodiode is a cathode, and the second terminal of the second photodiode is a cathode.
45. (new) The apparatus of claim 6, further comprising:
a first resistor coupled between first photodiode and a first one of the antenna terminals;
a second resistor coupled between the first photodiode and the second photodiode; and
a third resistor coupled between the second photodiode and a second one of the antenna terminals.
46. (new) The apparatus of claim 45, wherein the first photodiode is coupled between the first one of the antenna terminals and a circuit node that is between the second and third resistors, and the second photodiode is coupled between the second one of the antenna terminals and a circuit node that is between the first and second resistors.
47. (new) The apparatus of claim 45, wherein the antenna terminals are coupled between the first and second photodiodes.
48. (new) An apparatus, comprising:
a laser configured to generate an optical signal with an optical beat;
an antenna connection;

a first photodiode configured to receive the optical signal from said laser and to generate a first millimeter wave signal based on the optical beat, and to receive a second millimeter wave signal from the antenna connection; and

a second photodiode configured to receive the optical signal from said laser, to generate a third millimeter wave signal based on the optical beat, and to send the third millimeter wave signal to the antenna connection,

wherein the first photodiode is further configured to mix the second millimeter wave signal with the first millimeter wave signal so as to generate an electrical beat between the first and second millimeter wave signals.

49. (new) The apparatus of claim 48, further comprising:

a first resistor coupled between a first terminal of the first photodiode and a first terminal of the second photodiode;

a second resistor coupled between the first terminal of the first photodiode and a second terminal of the second photodiode; and

a third resistor coupled between a second terminal of the first photodiode and the second terminal of the second photodiode.

50. (new) The apparatus of claim 49, wherein the first terminal of the first photodiode is an anode, the first terminal of the second photodiode is an anode, the second terminal of the first photodiode is a cathode, and the second terminal of the second photodiode is a cathode.

51. (new) The apparatus of claim 48, further comprising:

a first resistor coupled between first photodiode and the antenna connection;

a second resistor coupled between the first photodiode and the second photodiode; and

a third resistor coupled between the second photodiode and the antenna connection.

52. (new) The apparatus of claim 51, wherein the first photodiode is coupled between the antenna connection and a circuit node that is between the second and third resistors, and the

second photodiode is coupled between the antenna connection and a circuit node that is between the first and second resistors.

53. (new) The apparatus of claim 51, wherein the antenna connection is coupled between the first and second photodiodes.